Citation:

van Asselt E, Fischer A, de Jong AE, Nauta MJ, de Jonge R. Cooking practices in the kitchen-observed vs. predicted behavior. *Risk Anal.* 2009; 29 (4): 533-540.

PubMed ID: 19178658

Study Design:

Observational Study; Home Videotaped Study

Class:

D - Click here for explanation of classification scheme.

Research Design and Implementation Rating:

NEUTRAL: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

To validate the obtained transfer rates with consumer data obtained by video observations and microbial analyses of a home prepared chicken-curry salad.

Inclusion Criteria:

Participants who were told that they would be part of a study on the “quality of a prepared meal" and willing to be involved in videotaping of food safety behavior and food handling practices.

Exclusion Criteria:

Participants who did not comply with the prescribed recipe.

Description of Study Protocol:

Recruitment

25 participants were recruited by placing advertisements in local newspapers.

Design

Observational Study

Blinding Used

Not applicable

Intervention

- The participants were asked to prepare a chicken salad, using the ingredients and recipe provided by the researchers. The chicken meat had to be boiled; boiling times were not

mentioned, hence participants were allowed to determine duration of heating themselves. Participants were videotaped. After the respondent prepared the meal, it was immediately placed in a cooling box containing ice packs to be transported to the laboratory for microbial analysis.
- The number of bacteria found in the prepared salad depended both on the number of bacteria transferred through cross-contamination and the number of bacteria surviving the cooking step
- The observed cross-contamination behavior was used to select the appropriate transfer rates
- Heating times, cross-contamination behavior and consumer safety performances (depicted in log reductions in the prepared salad) of the participants were recorded.

Statistical Analysis

- The model predicts the data with a regression coefficient
- Reduction levels (Ns/N0) were estimated
- Various scenarios were calculated with the model using all items changed for clean ones, all items rinsed in cold water, all items washed with soap and none of the items washed or changed between cutting raw chicken and fruits.

Data Collection Summary:

Timing of Measurements

Varied due to cooking time

Dependent Variables

Independent Variables

Control Variables

- The participants were asked to prepare a chicken salad, using the ingredients and recipe provided by the researchers. The chicken meat had to be boiled; boiling times were not mentioned, hence participants were allowed to determine duration of heating themselves.
- Participants were videotaped. After the respondent prepared the meal, it was immediately placed in a cooling box containing ice packs to be transported to the laboratory for microbial analysis.
- The number of bacteria found in the prepared salad depended both on the number of bacteria transferred through cross-contamination and the number of bacteria surviving the cooking step.
- The observed cross-contamination behavior was used to select the appropriate transfer rates.
- Heating times, cross-contamination behavior, and consumer safety performances (depicted in log reductions in the prepared salad) of the participants were recorded.

Description of Actual Data Sample:

Initial N: 25 participants

Attrition (final N): 24 participants

Age: not mentioned

Ethnicity: not mentioned

Other relevant demographics:

Anthropometrics

Location: Netherlands

Summary of Results:

Key Findings

- Model predictions indicated that cooking times should be at least 8 minutes and cutting boards need to be changed after cutting raw chicken in order to obtain safe bacterial levels in the final salad.
- The model predicted around 75% of the variance in cross contamination behavior.
- Besides cross-contamination, undercooking may lead to campylobacteriosis.
- Highest reductions were obtained for participant A, who cooked the chicken for 23'41'
- Participants D,M, N, P, Q, V, W, and Y undercooked their chicken (which is 33% of all participants), leading to an unsafe salad.
- The majority of the participants changed their cutting board and knife.
- Only 25% of the participants washed their hands with soap after touching the raw chicken.
- 25% of the participants did not wash one or more items, which may have led to cross-contamination.
- Participants indeed achieved low log reductions, meaning that a high number of microorganisms remained in the final salad.
- Most of the other participants either washed or rinsed the various cross-contamination items.
- Although the model does not predict 100% of cross-contamination behavior, it manages to predict around 75% (a limited set of cross-contamination behaviors and heating times.
- A large proportion of the participants in the reported study (58%) heated the chicken for less than 15 min, which may explain the lower reductions found.
- This study showed that a third of the participants undercooked their chicken.
- Only 29% of the participants managed to prevent cross-contamination.
- Failure to adequately wash or change cutting boards and knives occurred less frequently (between 29% and 33%) than insufficient hand washing (66%).
- Most people briefly rinsed their hands, which is not sufficient to eliminate all microorganisms.
- A large proportion of the participants in the reported study (58%) heated the chicken for less than 15 min, which may explain the lower reductions found.

Author Conclusion:

- The model accuracy can be improved, the model predictions are sufficiently good to estimate the importance of cross contamination in the domestic environment.
- Based on observed behavior on hand, cutting board, and knife usage during domestic cooking, the appropriate transfer rates can be selected and used to quantify cross contamination in the home.
- The model as such can then be used as a worst-case estimate of cross contamination behavior and can be applied in a total farm-to-fork MRA to evaluate its importance on the food safety level of the final product.
- The model proved to be fail-safe, which implies it can be used as a worst-case estimate to assess the importance of cross-contamination in the home.

Reviewer Comments:

Small sample size of 24 subjects. Other confounding factors need to be considered to evaluate this model to study the food safety behavior and other indices. More demographic details of the subjects e.g. education, age , gender are necessary which may influence behavior.

Research Design and Implementation Criteria Checklist: Primary Research

Relevance Questions

1.	Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies)	Yes
2.	Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about?	Yes
3.	Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice?	Yes
4.	Is the intervention or procedure feasible? (NA for some epidemiological studies)	Yes

Validity Questions

1.	**Was the research question clearly stated?**	Yes
1.1.	Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified?	Yes
1.2.	Was (were) the outcome(s) [dependent variable(s)] clearly indicated?	Yes
1.3.	Were the target population and setting specified?	???
2.	**Was the selection of study subjects/patients free from bias?**	???
2.1.	Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study?	Yes
2.2.	Were criteria applied equally to all study groups?	N/A
2.3.	Were health, demographics, and other characteristics of subjects described?	No
2.4.	Were the subjects/patients a representative sample of the relevant population?	???
3.	**Were study groups comparable?**	N/A
3.1.	Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT)	N/A
3.2.	Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline?	N/A
3.3.	Were concurrent controls used? (Concurrent preferred over historical controls.)	N/A
3.4.	If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	N/A

3.5.	If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.)	N/A
3.6.	If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	N/A
4.	**Was method of handling withdrawals described?**	Yes
4.1.	Were follow-up methods described and the same for all groups?	Yes
4.2.	Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	Yes
4.3.	Were all enrolled subjects/patients (in the original sample) accounted for?	Yes
4.4.	Were reasons for withdrawals similar across groups?	N/A
4.5.	If diagnostic test, was decision to perform reference test not dependent on results of test under study?	N/A
5.	**Was blinding used to prevent introduction of bias?**	Yes
5.1.	In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate?	No
5.2.	Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.)	Yes
5.3.	In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	N/A
5.4.	In case control study, was case definition explicit and case ascertainment not influenced by exposure status?	N/A
5.5.	In diagnostic study, were test results blinded to patient history and other test results?	N/A
6.	**Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were interveningfactors described?**	Yes
6.1.	In RCT or other intervention trial, were protocols described for all regimens studied?	N/A
6.2.	In observational study, were interventions, study settings, and clinicians/provider described?	Yes
6.3.	Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	Yes
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	N/A

6.5.	Were co-interventions (e.g., ancillary treatments, other therapies) described?	N/A
6.6.	Were extra or unplanned treatments described?	N/A
6.7.	Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups?	N/A
6.8.	In diagnostic study, were details of test administration and replication sufficient?	N/A
7.	**Were outcomes clearly defined and the measurements valid and reliable?**	Yes
7.1.	Were primary and secondary endpoints described and relevant to the question?	Yes
7.2.	Were nutrition measures appropriate to question and outcomes of concern?	Yes
7.3.	Was the period of follow-up long enough for important outcome(s) to occur?	N/A
7.4.	Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures?	Yes
7.5.	Was the measurement of effect at an appropriate level of precision?	Yes
7.6.	Were other factors accounted for (measured) that could affect outcomes?	Yes
7.7.	Were the measurements conducted consistently across groups?	N/A
8.	**Was the statistical analysis appropriate for the study design and type of outcome indicators?**	???
8.1.	Were statistical analyses adequately described and the results reported appropriately?	???
8.2.	Were correct statistical tests used and assumptions of test not violated?	???
8.3.	Were statistics reported with levels of significance and/or confidence intervals?	No
8.4.	Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	N/A
8.5.	Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	???
8.6.	Was clinical significance as well as statistical significance reported?	N/A
8.7.	If negative findings, was a power calculation reported to address type 2 error?	N/A
9.	**Are conclusions supported by results with biases and limitations taken into consideration?**	Yes
9.1.	Is there a discussion of findings?	Yes

	9.2.	Are biases and study limitations identified and discussed?	Yes
10.	**Is bias due to study's funding or sponsorship unlikely?**		Yes
	10.1.	Were sources of funding and investigators' affiliations described?	Yes
	10.2.	Was the study free from apparent conflict of interest?	Yes